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Educational Research: Directions and Implications

– Jon E. Pedersen*

Abstract:

Why do educational research? This is a key question posited by Penelope Peterson (1998). Although there are no set answers to this question, we must ask ourselves what is the purpose of educational research and for whom do we engage in research. This article encourages contributors to this section of the ICASE Journal to develop a clear intent to advance meaningful research agendas that communicate results to key policy makers and practicing teachers. Unless we do so, we are destined to maintain a path of "monolithic research agendas" that are held by most in low esteem (Peterson, 1998). We must to take on a more expansive view of research that is steeped in the practice of examining our own effectiveness and the ability of our graduates to teach students in a variety of situations. As well, we must be conscious about whom we engage in the scholarly practice of research. We must, as Crawley (1998) indicates, consider teachers as critical inquirers of their own practice and create collaborations with these teachers and make this new knowledge public. It is through such practices that we may be able to respond effectively to those who criticize educational research and respond more effectively as to why we are doing research...and show that it makes a difference. ***Key Words:*** *Action Research, Collaborative Research, Teacher as Researcher, Educational Research, Reflective Practice.*

Educational Research: Directions and Implications:

There are many significant issues in educational research throughout the world. It seems for many the critical question that we are striving to answer is: are universities and colleges doing a good job of preparing effective teachers and doing relevant research to improve practice? But what drives the research we do? What is the motivation and purpose of scholarship (research) in institutions throughout the world? Do we fall in the trap of the monolithic research paradigm that has been embodied by colleges and schools of education? Or do we to take on a more expansive view of research that is steeped in the practice of examining our own efficacy and the ability of our graduates to teach students in a variety of situations? I believe that we need to ask ourselves some key questions regarding our research. For example, does our research have an impact on the practice of teachers teaching science? Robinson (1989) so aptly argues that overall educational research has had a limited impact on educational practice. Furthermore, Penelope Peterson (1998) in an article in the Educational Researcher presents some key questions regarding not only educational practice, but also educational research. She states: *"Why do educational research? The public holds educational research in low esteem; policy makers increase funding for reform but not for research. Is this a "wake-up-call?" Why not begin conversations to consider our research by asking, "What is educational research contributing to whom and how?" Why do others not see value in research? How might research become more understandable and accessible? How might we develop shared understandings in education communities? How might we contribute to reforming education policies and practices? (4)*

There is ample evidence that academics in the past have done a poor job of defining themselves vis-a-vis research (Leveine, 1996). We must be able to delineate our research agendas and as Anderson (1993) indicates gain insight into the purpose and point of the research endeavor. We must, as Peterson (1998) suggests, "integrate what we know into the contexts that mater in education." (4) It is not enough to do research, we must do research that impacts the nature of who we are as a profession. As well, we must consider who engages in the scholarly process of research. As Crawley (1998) indicates, teachers must become critical inquirers of their own practice and

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make this knowledge public. That is, teachers must be partners in the processes of ".. .informing and transforming the science teaching profession as a whole." (Crawley, 1998) (3) As important as these perspectives are, it is critical that these perspectives match the goals of and perspectives of an international audience. Project 2000+ (1993), a document produced at the UNESCO meeting in Paris, France, is a world declaration on education for all. It is a good reference point to consider the broader purposes and perspective of educational research at the international level.

At the core of this document is the perspective that education for all is the corner stone for self-reliant development. In part, Project 2000+ indicates, that there is a need to develop and maintain learning programs that are responsive to the needs of individuals and communities. As well, there should be a focus on ensuring equity of access for science and technology education, most notably for women and girls, young children and other under-represented groups. Developing in-school and out-of-school opportunities, programs, curricula and assessment procedures is also a key, as is encouraging and supporting evaluation, research and development of science and technology education in formal and informal settings, and creating partnerships with public and private educational bodies and councils. These perspectives from Project 2000+ (1993) parallel the calls for research that emphasize a critical examination of our own practices through collaborations and partnerships with classroom teachers. Ultimately, the goal of all of our research should be to inform and change practice as a whole.

The Journal of International Science Education serves as a means for associations, institutions, centres, foundations, companies and individuals concerned with science education, to share perspectives, concerns, ideas, and information which will foster cooperative efforts to improve science education, and which will serve as a chronicle of the advancement of science education throughout the world. I would urge contributors to this section to focus on research...

- That involves collaborations with teachers in classroom settings;
- That focuses on the impact of research on changing practice—systemically;
- That examines the effectiveness and/or ability of graduates from programs that prepare teachers of science;
- That informs and shapes policy and practices at a local, regional or national levels;
- That develops shared understandings in educational communities;
- That brings research to the attention of teachers and policy makers;
- That uses various methodological and analytical considerations;
- That has as its focus action research or teacher as researcher;
- That examines cultural differences as it relates to learning science; and
- That examines the access of science learning to women, young children and other underrepresented groups.

Obviously this list is not all-inclusive. However, I would encourage each contributor to consider the questions asked by Penelope Petersen (1998) as they engage in their research. That is, why are we doing research...and does it make a difference.

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Constructivisite Approach in Course Design with a Reference to Cooperation of Industry and Schools.

– Rathindranath De*, Goutam Bhattacharay**

1. Introduction

NATIONAL CURRICULUM FRAMEWORK (NCF), 2005 has expressed concerns over the following aspects of our educational practices:

a) Lack of flexibility in school system rendering it resistant to change.
b) Creative thinking and insights are not encouraged in the process.
c) Learning has become an insular activity devoid of real life experiences.
d) Method of learning does not incorporate the human capacity to create new knowledge.
e) At the cost of present learning process, the 'future', in a myopic sense of the term, of the learner is attempted to be insured.

NCF, 2005 seeks to provide a framework within which teachers and schools can choose and plan experiences that they think the learners should have. For this it addresses the following questions:

a) What educational purposes should the schools seek to achieve?
b) What educational experiences can be provided that is likely to achieve these purposes?
c) How can these educational experiences be meaningfully organized?
d) How do we ensure that these educational purposes are indeed being accomplished?

The NCF draft, 2005, reflects, "The teacher's own role in children's cognition could be enhanced if they assume a more active role in relation to process of knowledge construction in which children are engaged. A child constructs her/his knowledge while engaged in the process of learning[1]."

The author in his present paper delves into the constructivistic approach in course designing and curriculum planning which, as National Curriculum Framework, 2005 has observed in its guiding principles, will:

a) connect knowledge to life outside school;
b) ensure that learning is shifted away from rote methods;
c) enrich the curriculum to provide for overall development of children rather than remain textbook-centric, and
d) make examinations more flexible and integrated with classroom life.

In position papers[2], where National Concerns are noted, the National Focus Group recommended the following in the context of pedagogy:

"1. Incorporation of diverse pedagogic methods and practices towards enhancing learning and democratic classroom practice is essential.
2. We need to develop constructive critical pedagogy and specific guidance on classroom practices
3. To enable teachers and students to participate freely in knowledge construction and learning."

2. Approach to Course Design

'Course Design' is the term used for tactical planning process that is positioned between the

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large-scale strategic level of curriculum development and the small-scale operational level of instruction design. This planning process involves analysis of the specific needs, the analysis of favourable and inhibiting conditions for implementation, and the selection and application of instructional theories. The aim of this section is to review the concept of constructive approach (W.Winn) to course design as well as its application in formal education.

2.1 A Constructive Approach

The central idea in constructivism is that students construct knowledge for themselves. From a radical point of view, knowledge construction implies that each person knows the world in a different way, that there is therefore no shared objective knowledge to teach about, and consequently that instructional analysis and prescription make no difference to what students learn[3] (Winn 1993). From an extreme perspective, there is nothing that instructional designers can do to affect students' understanding and behaviour if knowledge is entirely constructed by students. If constructivists are right that students do not react in predictable ways to instruction and that what is taught has no factual, conceptual, rule-based or procedural foundation in the real world, it is pointless to design courses. However, not all constructivists take this radical position.

Constructivism holds that learning is a process of building up structures of experiences. Learners do not transfer knowledge from the external world into their memories, rather they create interpretations of the world based upon past experiences and their interactions in the actual world[4] (Cunnigham 1992a, 1992b). In the constructivist view, a course should provide contexts and assistance that will aid the individual in making sense of the environment as it is encountered[5] (Duffy and Jonassen 1992). The evident anatomy of learners in knowledge construction makes it difficult if not impossible to predict how they will learn or to plan instructional activities[6] (Winn 1992). Examples of constructivist design is offered by Spiro[7] et al., (1992) in the form cognitive flexibility hyper-texts, and refers to the design of non-linear computer learning environments.

Learning is conceived to be synonymous with acculturation and is encouraged through practices no different from those found in societies having no formal system of schooling. The educational process may stress the process of making meaning rather than the end of arriving at a particular understanding (Winn 1993).

Lowyck and Elen[8] (1993) assert that the transition in the theoretical foundations of course design toward constructivism requires us not only to change the design prescription but also to consider and investigate the mental models and cognitive skills of the instructional designer. It seems as if a constructivistic approach to design is a contradiction in terms. Under constructivism, students select and develop their own learning strategies, and often their own goals and objectives. What should there still be designed? The constructivistic approach probably offers help in complex, ill-structured domains of advanced knowledge. The design will focus on providing flexible and varied amounts of guidance to learners who find their own way in constructing their own knowledge.

As it is noted in NCF, 2005, "These capabilities, practices and skills of understanding are what we seek to develop through the school curriculum.....

This approach to knowledge necessitates a move away from 'facts' as ends in themselves, to locating facts in the process through which they come to be known, and moving below the surface of facts to the deeper connections between them which give them meaning and significance[9]."

3. Scientific Software Tools in Course Designing:

The development of educational software is a complex process requiring a variety of skills and a

considerable ampunt of time. Software tools are computing environments that carry out, facilitate, or speed up any of the tasks involved in the process of designing and producing courseware. Many software tools for course designing are adopted or adapted from commercially available packages : word processors, paint and draw programmes, character definition software, graphics editors, idea processors, and modelling programmes are some examples.

An Australian project[11] explored interactions between industrial training and the more general educational approaches taken by schools. The project runs courses in courseware development for teachers and practitioners from the computer based training industry together, aiming to expose industry trainers to the educational philosophies behind the school-level coursewares, while taking advantage of new authority tools and multimedia facilities to increase teachers' courseware productivity.

4. Conclusion In NCF, 2005 one of the issues for systemic reforms deals with teacher training. It opines that professional training of teachers needs to be linked to post-graduate studies in different subjects in order to promote interdisciplinary enquiry. Courses of language proficiency should form an integral part of pre-service programmes. The need is to create teachers who can respond to the needs of children and their learning. It has been stated in NCF, 2005, " Active engagement involves enquiry, exploration, questioning, debates, application and reflection leading to theory building and creation of ideas/positions [10].

From the 1960s detailed and intensive study on educational change process had been made, and "innovations" became the mark of progress. Around 1970, however innovation suddenly fell into disrepute, to be replaced by the term "implementation". It was taken care of that innovations were not simply adopted without any forethought being given to followthrough. The six themes in concert—vision building, evolutionary development, initiative taking and empowerment, staff development and support, monitoring and evaluation, and restructuring-are required for substantial change to occur.

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Paradigm Shift in Science Education

– Rita Sinha*

Introduction :

In the present century, science dominates almost every field of our life. Students in the educational institutions have to be educated in science effectively so that they are able to face the world with confidence, courage and dignity. New novel and unique methods of teaching science have to be developed by teachers so that learning becomes more effective and efficient. For this purpose mission, vision and milestones must act together. Science is the cyclic enterprise consisting of the formulation of model or theory or explanation from facts. Theory is an aspect of the entire body of knowledge.

Epistemology is the theory of knowledge. Rationalism regards reason as the source of true knowledge. Empiricism regards experience as the source of true knowledge. Apriorism regards reason and experience both as the source of knowledge. Intuitionism regards in tuition as the organ of knowledge. Philosophers believe it is more than knowledge. It is of higher order.

The nature of paradigms :

The basic pre-suppositions of a scientific theory can be called '*paradigms*'. Karl Popper (1957) remarks that the belief that inductive inference which is based on many observation is a myth. Hypothesis are to be developed and attempts made to falsify them through empirical research. He writes that there is no more rational procedure than the method of trial and error of conjecture and refutations of boldly proposing theories of trying our best to show that these are erroneous and of accepting them tentatively if our critical efforts are unsuccessful. In his book '*The Logic of Scientific Discovery*' he encapsulates the essentials of his method of falsification. He criticizes the view that inductive inference provides a universal method for obtaining the general laws of Nature through maximum number of empirical observations. When a hypothesis is tested and accepted and not falsified, the evidence for the acceptance is not deductively conclusive like a mathematical equation, for example, $x^2 - y^2 = (x + y)(x - y)$. In fact the evidence merely describes strong inductive confirmation. Becon's inductive method resulted in the accumulation of isolated bits of information. Charles Darwin intergrates the most important aspects of the inductive and deductive method which is known as inductive – deductive method. In modern terminology the method is described as inductive – hypothetico – deductive method. Scientific method involves a double movement of reasoning from induction to deduction, in its simplest form, it consists of working inductively from observations to hypothesis and then deductively from the hypothesis to the logical implications of the hypothesis in relation to what is already known. Thomas Kuhn gave organic character to science through his book '*The Structure of Scientific Revolutions*'(1962). Kuhn's view of science thinks in terms of communities of scientists rather than of individuals. Kuhn remarked that the most characteristic features of the scientific enterprise in its conservatism, which is seen as the consequence of the prolonged indoctrination that scientists receive during their training. This is an indoctrination within the

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confines of '*paradigm*'. Kuhn aptly observes that it is the paradigm which represents the structured whole of a given science. It guides the research activities of its community. Paradigm is a whole way of thinking and acting within a given field. N. L. Gage (1963) wrote that paradigms are models, patterns or schemata. Paradigms are not theories; they are rather way of thinking of pattern for research that when carried out, can lead to the development of theory.

Paradigms derive their usefulness from their generality. They apply to all specific instances of a whole class of events of processes. When a researcher chooses a paradigm for his research, he decides the kinds of variable and relationships between variable.

A second characteristic of paradigm is that they often represent variables and relationships in some graphic or outline form. The classical portrayal of Pavlovian conditioning explains this accept of paradigm as shown in the following Fig. 1.

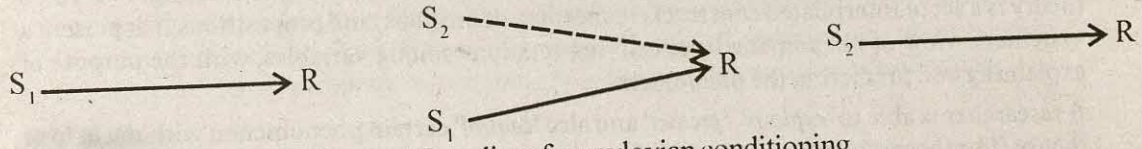

Fig. 1 : A Paradigm for pavlovian conditioning.

In the dictionary, the word paradigm, is said to mean '*Model*' or '*example*', Gage (1963) writes, paradigms like theories, can be either explicit or implicit. Some have been set forth by their authors in full panoply, with diagrams and collaborations of their connections with completed or projected research. Other paradigms are implicit in what authors have done or proposed by way of research, in these cases, we shall attempt to explicate the paradigm. Kuhn defines a '*paradigm*' as a way of looking at the world. In his view, paradigms are broad, quasimetaphysical insights about a phenomena. To conceptualise and agreed upon is known as paradigm by Kuhn. Paradigms give panoramic view to see something from all directions. Human beings can receive, share and criticise. Paradigms depend on his way of thinking, and how he views the environment. All scientific observations are determined by paradigms. The interpretation, how to make use of the present circumstances is paradigm.

However, the paradigms are provisional, transitory, temporary and can be valid only today. Kuhn observed that a paradigm has a certain life span, and its development conforms to certain predictable sequences. When a theory is fully accepted by a majority of researchers it is said to be in its normal phase or condition. However, after the normal phase, when a number of empirical inconsistencies begin to crop up, the paradigm eventually faces a crisis phase. Kuhn calls these inconsistencies anomalies. He remarked that new discoveries begin with the awareness of anomaly – that is nature has in some way violated the expectations aroused by the paradigm. If at the point of crisis a new paradigm is proposed, especially one based on fewer assumptions that more parsimoniously explains these anomalies, the new paradigm may simply overwhelm the previous one and thus become the accepted paradigm. The paradox associated with paradigm shift is that genuine anomaly is acknowledged only when there is a detailed body expectations from which it sticks out like the proverbial sore thumb. The replacement of the older paradigm by a new one does not mean that older paradigm was totally wrong. It describes its inability to handle the newly discovered anomalies.

Theory and Paradigm :

Theory is a tentative symbolic representation of nature. On the basis of observation facts are found. On the basis of observation of the occurrence of events certain laws are formulated, science is the cyclic enterprise consisting of the formulation of a theory or model or explanation from facts which in turn predict the occurrence of new facts. If new facts are found, the value of model or theory is enhanced. Bridgman (1951) laid great emphasis on the empirical method for theory – construction. In his view, the concepts of a theory are synonymous with the corresponding sets of operations.

Frederick Fitzpatrick (1960) writes that science is a cumulative and endless series of empirical observations which results in the formulation of concepts and theories, with both concepts and theories being subject to modification in the light of further empirical observations. Science is both a body of knowledge and the process of acquiring it. According to Kerlinger (1978), a theory is a set of interrelated constructs (concepts), definitions, and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena.

A researcher is able to *'explain'*, *'predict'* and also *'control'* certain phenomenon with the help of theory. The theory, however, is regarded as tentative and not the ultimate truth. It is subject to revision or modification as new evidence is found. It is tentative approximation to the structure of reality which is basically dynamic in its nature.

Gage (1963) writes that we use the term theory in a modest sense to refer to any systematic ordering of ideas about the phenomena of a field of inquiry. We use the term in antitheses to ad hoc, disorderly, planning or interpretation of research. Our concern with theories and paradigms is therefore aimed at furthering more systematic and orderly approaches to the formulation of the variables and hypotheses that enter into research on teaching. We urge on movement away from facts. It is merely the ill-considered collection of facts against which we urge. We should not aspire to any large-scale deductive system, with theorems vigorously derived from postulates and axioms. But neither should we remain content with more factual data – averages, differences, or correlations – on which the research worker has imposed little rationale.

Paradigms may be found in Skinner's work. If paradigms are not useful in discovering a new truth, they may at least be useful in communicating it. Kuhn (1962) observed that it is the paradigm which represents the structured whole of a given science and also guides the research activities. Paradigms represent the totality of the background information, the laws and theories which are taught to the researcher must accept as if they were true. Skinner (1950) emphasizes upon the general principle of a theory. He used the term *'theory'* to refer to *"any explanation of an observed fact which appeals to events taking place somewhere else, at some other level of observation, described in different terms, and measured, if at all, in different dimensions"*.

Earl Babbie (2004) writes that paradigm is a model or framework for observation and understanding, which shapes both we see and how we understand it. The conflict paradigm causes us to see social behaviour one way, the interactionist paradigm causes up to see it differently.

It is the main thesis of A. K. Sinha (1969) that a theory embodies within itself the cognitive purpose of a theorist as he cognitively interacts with the environment. In his view, the teleological principle is the foundational principle of reality. The telic principle has become well-defined

in human personality in course of evaluation. It is responsible for decision making, free choice of an alternative out of a ultitude, and planning. It gives orientation to a theorist in his theorising activity. A theory establishes a link between the telic structure of personality and the telic structure of nature. A theorist constructs a theory of nature with the aid of his own telic principle as the matrix of cognitive process. The telic principles in the personality a theorist regulates all the perceptual, imaginative, and rational activities in the process of theory-construction. In fact, knowledge is "*a form of theoretical construction*".

The author of this paper feels that there is paradigm shift in science education. Along with group instruction, individualized instruction is also needed which helps a student to learn at his own rate, own speed, own pace and own style. Paradigm shift is from group instruction to individualized instruction. In traditional method of teaching, teacher was necessary. Now no physical or personal presence of teacher but instructional material is necessary. Not only '*Education for all*', but '*Science for all*' is the need of the hour. The two terms '*wastage*' and '*stagnation*' have changed because there is open learning system by correspondence course through open school and Open University. The telic individual has to be educated in such a manner so that his creativity, curiosity, confidence, competence, compassion commiseration and courage develops.

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Teaching and Learning Mathematics

– Kanak Kanti Das*

ABSTRACT: In this article attempt has been made to suggest some speech of Teaching & Learning Mathematics. Discussion has been made on "*Aim of Mathematics Education, what Mathematics teaching is? What are to the ways to reach the learners?*" Specially stressing the utilities of problem solving. A few such cases have been discussed. Lastly the task of Mathematics Education was highlighted.

Teaching and learning are as old as civilization. The psychological as well as practical aspects underlying educational processes have been investigated extensively in the face-to-face classroom mode. Investigation has also been made into the more recent mediated or distance education mode. These investigations have been formalized as pedagogy which is the art & science of teaching, andragogy, dealing with problems of teaching & learning of adults with implications to lifelong learning & Mathematics, the science of learners' behaviour with implications to individualized learning. Still there is no single paradigm which can be said to be the best for a specific educational situation. There is now even a movement away from behaviourism which depended on experiments on experiments on animals.

Although the basic principles of educational communication remain unaltered, modification are required to make them subject-specific. For example though the basic aim of all educational communication is retention & transfer of learning, depending on the cognitive development, teaching & learning strategy may differ. What applies to mathematics or language teaching may not exactly apply to say, teaching of technology or medicine. Besides to know that is available from educational research such as psycho mathematics, we have to look to role models. It is our aim in this article to emphasis that a combination of different strategies is suited to mathematical education.

Aim of Mathematical Education :

The International commission on education for the 21st century of UNESCO has cited four levels of learning as the four pillars of education:

- Learning to know for broad knowledge.
- Learning to do for skills & competence to earn.
- Learning to live together for understanding others.
- Learning to be for life long learning, development of personality & self-actualisation.
- Learning of mathematics like many other disciplines belongs to the 2nd category of learning to do.

Mathematics Teaching is a Creative Art as well as Science :

Karl Pearson in his grammar of science (1900) defines the function of science as the classification of facts, the recognition of their sequence & relative significance. The habit of forming a judgement upon these facts, unbiased by personal feeling is the characteristic of scientific temper. Science admits conclusions based only on evidence. Objectivity & precision both thought &

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action are the main characteristic of scientific temper. Mathematics has qualities of both art & science. It is imperative that teaching of mathematics must also reflect those qualities both in content & practice. Indeed all teaching is art & science. In teaching of mathematics the qualities are obvious.

Inductivism vs. Deductivism.

It is known that behavioural techniques are fit for small units of learning. But for complex learning tasks of higher mathematics which entail long-term retention problems, cognitive approach is desirable. It may be emphasized that all stages of mathematics learning, a certain amount of behavioural strategy of over learning is adopted, as over learning helps retention. There are two ways of mathematical presentation. Giving examples & then the rule is called induction. It is also known as discovery, problem solving method, bottom-up, insight-by-error or trial-by-error approach. It is explained as going from particular to general, simple to complex, local to global. Deduction may be defined as giving rules & then examples of these rules.

Learning oriented behavioural psychologists, on the other hand, point out that the more specific the presentation, the better is the insight & learning. For example, it is debated whether addition & subtraction should be taught as two separate but related operations as in traditional mathematics or as one operation as is done in more modern one.

Problem Solving

- Problem 1: Circumscribe a circle about a given triangle ABC.
- Comment: The problem, is reduced to fix the center x as the point of intersection of the perpendicular bisectQrs of AB & AC.
- Problem 2: Given two parallel lines & a point P between them. Draw a circle through P touching the given lines.
- Comment: If 2a is the distance between the lines, then the problem, reduces to fix the center as the intersection of a circle with center P, radius a & the line equidistant from the given lines.
- Problem 3: Given base, height & circumradius, construct the triangle.
- Comment: The problem is solved if the circumcentre of the triangle is discovered.
- Problem 4: Construct a parallelogram given one side & the two diagonals.
- Comment: The unknown quantity here is a triangle from the given side & semi diagonals.
- Problem 5: Construct a circle of sides; a, b, c.
- Comment: If the side AB=c is drawn, the problem is reduced to fix the vertex C as the intersection of a circle with center A, radius b & a circle with center B, radius a.
- Problem 6: Construct a trapezium of sides, a, b, c, d with a & c parallel.
- Comment: The unknown quantity is a triangle of sides a-c, b, d.

These problems illustrate that the solution depends on discovering the key idea.

The task of Mathematical Education

Considering the rapid increase in the use of mathematics today, issues of mathematical education deserves close attention. Mathematical education is concerned with the selection of mathematical content & communication leading to its understanding. What content is to be com-

municated is a complex process to decide. P. J. Davis & Hirsch in the book "The mathematical Experience" (1981) mention that about 200,000 mathematical theorems are produced every year. All these automatically don't become mathematical content. Some only of this fabricated mathematics takes a permanent form eventually & percolates into curricula fit for teaching. This is what is called mathematical content & the task of mathematical education is to make its communication effective both in the formal & non-formal systems.

Conclusions

So far transfer of learning is concerned, it is immaterial whether the learning was acquired through exposition or discovery. Hence in mathematics it is difficult to make a clear distinction between inductive teaching. The difference is ultimately illusory. The knowledge of numerous instances & case forms (an inductive process) causes development of a theory from which are deduced hypotheses (a deductive process) which are to be tried empirically. The burden of singular instances, the "tyranny of the particular" should not be allowed to suppress the explanatory power of the general statements.

Good teaching is subtle & intuitive. Elements of good teaching can come from the act of teaching itself & not perhaps, from experiments on animals. In this respect it is wiser to look to renowned teachers of the time as role models. Even then it will not be incorrect to say that behavioural principles suit students of the school stage & cognitive strategies are better at the tertiary level. For the gifted few students taught by great intellectuals, there is noting better than the super-cognitive "Moore method" of teaching mathematics. It is a Socratic, question-asking, problem-challenging approach to teaching. The teacher presents to the students a bare outline of a topic by citing essential definitions & statements of theorems. The students are asked to read & mull over the topic. The subject is enlarged on the class by discussion. It is fit for a small class but not for a class of forty. P.R. Halmos has asserted that the students of his "Moore class" surpassed those of other classes.

In mathematics both finite & infinite, induction & deduction are equally relevant. Gian-Carlo Rota in Combinatorial Analysis (MIT Press, 1969) says: "God created infinity & man unable to understand infinity, had to invent finite sets." In the ever-present interaction of the finite & the infinite, lies the mystery of the universe. In the ever-present interaction between the particular & general, behavioural habits & cognitive structures, discrete & continuous, ordinary discontinuity & catastrophe, inductive reasoning and deductive logic, lies the fascination of all that is Mathematics. Will we teach & learn mathematics this way?

Reference:

B.P. Parashar: Teaching and Learning of Mathematics,
University News, vol-37, No.-40, October 4,1999.

Context Rich Problems in Physics for Upper Secondary School

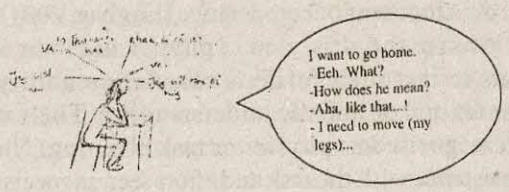
– Margareta Enghag[1,2], Peter Gustafsson[1], and Gunnar Jonsson[1]

Abstract : *This paper reports observations from one of several case studies of students working with context rich problems (CRP) and mini projects (MP) in an upper secondary school class. This small group work concerns the problem-solving of a context rich problem during an 80-minute lesson of physics. We have video-filmed a group of girls during their work, thereafter we have transcribed and analysed the videotape from how group discussions in physics influence the students' learning. Interactions between students during the group discussion are of different types. When it comes to development of conceptual understanding the girls go into exploratory talks, a kind of talks described by Douglas Barnes in the 1970s. The amount of talk within different categories of talk, how the amount of talk in different categories is divided amongst the girls, and their steps in the problem-solving are specified. The importance of time for reflective talks in physics to enhance learning is high-lighted by quotations from the girls' discussions.*

Key Words: Elementary science, constructivism, culturally and linguistically diverse students, student characteristics

Introduction

In the educational purpose to increase students' interest in physics at school and university, Context and Conversation in Physics is in progress as a cooperative effort between Malardalen University and Umea University. The physics courses in Swedish upper secondary school are found to be very demanding with an increasing amount of students dropping their courses. Two physics courses will cover the classical and modern physics on a calculus based level. This study reports observations from case studies of students working with context rich problems (CRP) and mini projects (MP) in an upper secondary school class. At start of the study, the students went through a physics test and gave their view of school physics as a written statement or/and a drawing. Here, we found a big shift from students mentioning physics in secondary school as fun and easy, to physics in upper secondary school as boring, difficult and with lack of time for reflections and physics talking, even though students still find physics interesting in itself.



"Booooring. Often rather difficult as well. Many parts are interesting if you have time to think of it, but that time does not exist. It is all about understand as fast as possible, and then study for the test, and then to move on." (Female student).

In order to study how group discussions in physics influence students' learning and their ownership of learning, we introduced CRP and MP. We recorded five groups, totally 15 students on video tapes during the beginning of their second physics course. The video analysis has been done with category based analysis of videotapes and with transcriptions of selected parts (Niedderer, 2000, 2002).

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Our study focus on group behaviour and individual activity within the groups, how this reflects in engagement of the task and perception of the question at issues, and any difficulties in reasoning and understanding of physical concepts. We also studied the students ownership of learning (Milner-Boloti, 2001; Savery, 1999; Enghag, 2004). In this paper, we report how communication takes place in a female group solving the CRP called "The Clay."

Student's Ownership of Learning.

The concept students' ownership of learning (SOL) includes student ownership given by the instructional setting: content, question, planning, performance, result and presentation. Student ownership of learning also includes choice of partnership in groups and choice of activities concerning where, when, and how. A main point is the ownership to communication; i.e., possibility to discuss with others, possibility to use media and teacher, and to allow emergence of own questions. Concerning control and responsibility, possibility to take informal leadership, to negotiate, or to follow the stream. From this view ownership has to be seen as a possibility or power for the students.

Students' ownership of learning (SOL) is described in two levels (Enghag, 2004):

Group level: The SOL is decided by the design of the task. The choice of task, the performance (when, how, where), the level of results, and how to present and report them have to be decided by the students themselves.

Individual level: A person's experiences and anomalies of understanding have created unique questions that can high-light aspects of the task that drive this person to be very active and motivated. This gives the person a high individual learner ownership.

Method and Design of the Study

This small group work concerns the problem-solving of two context rich problems during an 80-minute lesson of physics. We have video-filmed a group of girls during their work, thereafter we have transcribed and analysed the videotape from how group discussions in physics influence the students learning and their ownership of learning.

We have categorised the communication into the variables interest, motivation students' ownership of learning, and development of competence (Enghag, 2004).

Interest before start is given as the girls' view of physics and their result in a competence test, including 15 questions to test their formula calculation ability, their conceptual understanding, and their contextual or holistic understanding. Their motivation is decided from the amount of words categorised as physics or task planning (Niedderer et al, 2002; Enghag 2004), but also from persistence with the task and effort seen as special actions (Pressick-Kilborn, 2003; Ryan & Deci 2000).) These special actions could be the existence of exploratory talks (Barnes, 1973, 1976; Barnes &Todd 1977), or internal teaching (Enghag, 2004), but also other types of actions as making creative suggestions to the group, or making measurements.

A context rich problem is a physics problem in the context of a story, given to a small group of three or four students. CRP was developed by the University of Minnesota. (Heller, Keith, & Anderson 1992: Heller & Hollabaugh, 1992). The design of the CRP encourages students to use a logical problem-solving strategy instead of plain formula driven random search strategies.

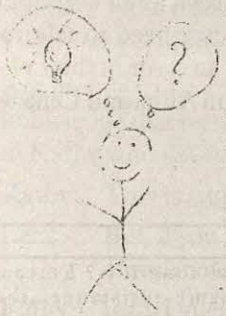
The CRP "The Clay ": description of the task

You have a lesson in electricity. The teacher is searching for a 1 kΩresistor to use in a circuit you will need in your lab. You play with a multimeter, and you measure the resistance in a cylinder shaped piece of play-clay

that you happened to get with you in your pocket when you was playing with your youngest brother. The multimeter shows 250 Ω. Then, you get an idea to produce a resistor yourself. Will it be 1 kΩ if you just make a roll of the clay and make it twice as long as it is now? Then it will fit into the holder in the lab equipment you need to use.

Give a report of assumptions, calculations, and conclusions.

Results



Anna: "I find it (school physics) rather difficult. It is hard because you have to understand, calculate and read at the same time. But it (the result) has been quite good so far. Also, the books are very boring. "

Kathy: "Physics can be interesting when you can keep up (with the teaching) and understand, but if not, it is hard not to think, it is hard and boring. Tough!"

Lena: "Booooring. Often rather difficult as well. Many parts are interesting if you have time to think of it, but that time does not exist. It is all about understand as fast as possible study for the test, and then to move on" (female student.)

From pictures and statements, the girls find school physics difficult and boring. The reasons for this are explained by the speed that leaves no time for reflection. To be sitting too long, working hard is arduous even if physics itself is interesting.

The physics test with five questions in formula calculations, five in conceptual understanding, and five in holistic understanding could give maximum (5, 5, 5) points. The three girls did: Anna (4, 1, and 4), Lena (4, 3, and 4), and Kathy (4, 2, and 5). They are all strong in holistic understanding, but not that accomplished in conceptual understanding, a situation that is a natural result of the teaching strategy of physics in secondary school as being more descriptive than focused on problem solving. They show a very positive attitude towards the session with CRP work. They are almost excited to start with the task and there is some competition in the air as the other groups are doing the same task;

Anna: They are ahead of us. (Can't find what she is looking for in the formula book.)

The girls have to face the problem that this is not a commercial resistor they have met before. Could it be compared with a wire? They also have to face the unknown material constant resistivity. Kathy discusses whether the length has any impact at all, as the volume is constant. Anna and Lena have this feeling that as the length increases, and the cross-section changes the resistance will be effected. They compare to water that will come through a tube. They find the area formula, but do not know the concept resistivity. As the same symbol is used for density, they discuss density. As the material is the same and the volume constant, their arguments function despite this anomaly. The electrical resistance of a wire would be expected to be greater for a longer wire, less for a wire of larger cross sectional area, and would be expected to depend upon the material out of which the wire is made. Experimentally, the dependence upon these properties is a straightforward one for a wide range of conditions, and the resistance R of a wire can be expressed as

$$R = \frac{Q.L}{A}$$

L = length, A = cross section, Q = resistivity).

In this situation they try to describe the relationship algebraically. Now, Kathy has problem

with the abstract language of algebraic notation, and Lena teach her how to think. Anna is sure of the solution, but they try to follow each other way of thinking, and suggest a final result. The CRP problem-solving timeline is presented in Table 1.

Special forms of group talk

Interactions between students during the group discussion are of different types. When it comes to development of conceptual understanding, the girls go into exploratory talks. This kind of talk is described in literature (Barnes, 1976; Barnes, 1977). They can be seen as an attempt to reach conceptual understanding or to maintain a conceptual change. They need to talk to a person they trust and who joins the searching for a solution, to a feeling of an error in their view of some phenomena, or as an anomaly in the understanding. In this situation Anna and Lena use exploratory talks to help each other recognize the resistance in wires...

Anna: It was something about how to use Ohm's law..

Table I : The CRP Problem-solving Time Line

Category	Time	Individuals
Realises the volume is constant	6.25	Kathy: But does it really matter how long it is? I mean, its width decreases but it is the same resistance...the volume is the same?
Realises that R increases with increased L	6.40	Lena: Yes...Yes that's right...it becomes smaller too. Anna: It gets wider.
Realises that R decreases with increased A. (inverse proportionality)	6.40	Lena: It is short and wide, short and wide gives less resistance than long and thin.
Realises that several variables affect A.	8.54	Lena: I actually think that it can be 1000 W, it is not just the increased length because the width is also smaller.
Realises that the resistance is the same	7.25	Anna: Yes, if it is the same composition as the modeling clay.
recognises the formula.	9.06	Lena: There is an area formula.
Realises that Q is the symbol for resistivity.	9.50	Anna: It has something to do with length and area. Lena: Here it is... Anna. What it the constant then.. .Q Lena: It is Q that is density. Anna: Density can be calculated. One has it.
Realises same symbol for several quantities, density, resistivity, Q	10.53	Anna : (looks in the formula book) They didn't have modeling clay. Otherwise they usually have lots of wire things. Lena : Is there anything like it? ... then you could guess ..: Is clay in there? (Anna looks in the formula book)
Realises the physical ramifications of the formula	12.06	Lena: I still think it will be this way. But yes... Anna: But can't we set this to 1, radius 1 to the length to 1 if...or we set x, we calculate with x and then set x by something-and then we can to something, I don't really know what. Lena: Yes, that is good.
Can describe the relationship algebraically	17.10	Anna: We have to write it down... Lena: ..it looks like this.. Anna:...We need to call it something. Don't you need to write 21... Lena: Yes, 21 divided by $^1/_2 A$.

Lena: Yes, that's what it was.

Anna. ..it was dependent upon the length and the area... Lena: ..cross section.

Anna: .. Here it is R that is resistance.

Lena. ..Yes, but then you have to have...

Lena: ..Yes...we can write the formula too. Do you recognize it?

Anna: .. Yes it has something to do with length and area in the fomula.

Lena: There it is. Do you recognize it?

Another type of communication seen is what we call internal teaching. Lena is pretty sure of her knowledge that resistance is increasing with the length, and goes for explaining the phenomena to Kathy who has never heard about it....

Kathy: This is stupid, I don't think there should be any change because....

Lena: But, if you have a copper wire that is this long (stretches out her arms), then there is a lot of resistance. But, if it is short and thick (uses her hands), then there is little resistance.

Kathy: Yeah, I guess.

Anna: Then there is room for many in the tub...You need to think about water, like you did in ninth grade.

They are very polite to each other and give each other confirmations that they have got the point of the other person's ideas:

Kathy: But, I am thinking about a really long rope that you fold up.

Anna: Then lets fold it up !

Kathy: Yes, I know, but I assume that it is the case.

Lena: O.K., so that's how you think.

Another example of this phenomenon:

Kathy: So half of it will be there.

Lena: That is what you say.

Anna: That's what you say.

Kathy: No. (takes the paper)

Anna: 21 divided by '/zA is it. Then you have the formula and if you expand it with 2 and multiply with 2 then you get 41. That is how it is done. Lena: Are you in agreement? Kathy: The length is shortened when the area increases. Look! If you take half it is not 41.

Lena: Are we in agreement then? Kathy: Yes, I agree with that. Lena: But.

Anna: But, it does not make any difference, we need an answer! Lena: That is what we did. We have to be in agreement, all of us. But, we are not in a

hurry. Do you know what to do, if you look at it a little... and then you say...

Motivation and amount of different types of talk in the group

To give a dynamic picture of how the talk is developing by time, we divided the amount of talk during the session in three parts.

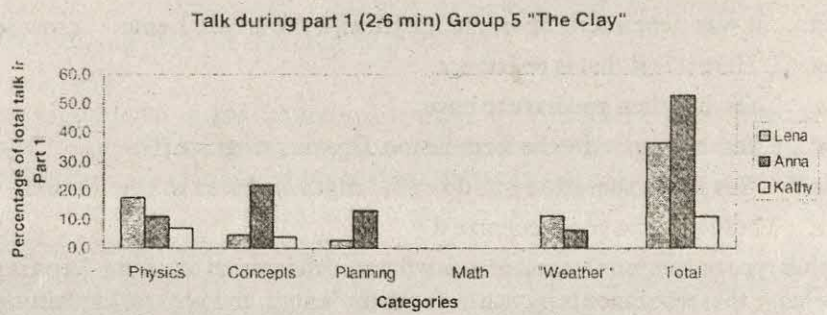


Figure 1. Individual amount of talk divided into categories (Percentage of total talk in each category), Part 1: 2-6 min.

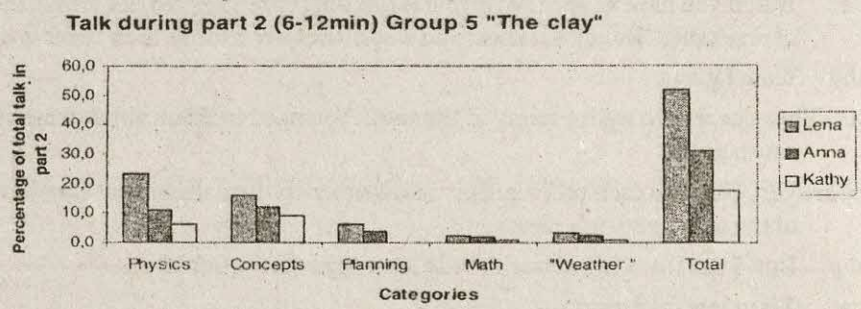


Figure 2. Individual amount of talk divided into categories (Percentage of total talk in each category), Part 2: 6-12 min.

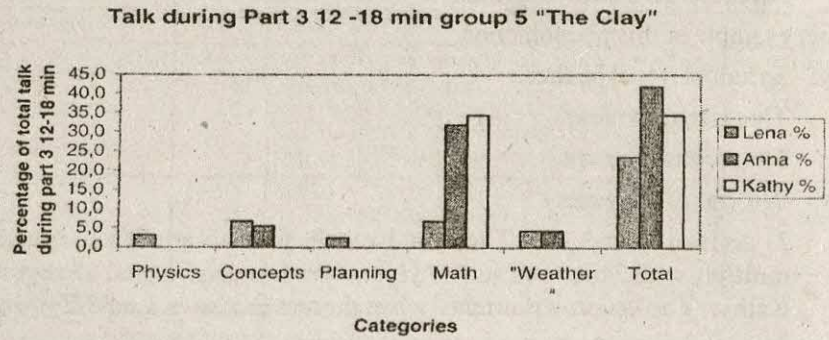


Figure 3. Individual amount of talk divided into categories (Percentage of total talk in each category), Part 3: 12-18 min.

From Figures 1, 2 qnd 3, we see how Anna and Lena have the initiative and become dominant in the physics and planning talk. We can see how Kathy's talk is increasing during the three parts of the session, and how it increases when it comes to mathematical problem-solving. They are all very focused on the task, only 12 % of the talk concerns non-task talk. In total, Lena does 40% of all talking, Anna 35%, and Kathy 25%, which gives the group an equal profile when

comes to communication. They do not spend much time on planning (8%), but the planning category is not equal in the group. Lena takes 67% of the talk in this category, Anna 25%, and Kathy only 8%. This gives Lena strong ownership and motivation to the task.

Persistence with the task

They work hard and the total time spent on the problem is 30 minutes, but the problem was solved after 17 min.

Table 1

Percentage Amount of Words Used in Categories and by Individuals.

Table 1

Percentage Amount of Words Used in Categories and by Individuals.

Percentage of words	Lena	Anna	Kathy	Percentage of words per category
Physics-physics concept	40%	33%	27%	40%
Result-planning	67%	25%	8%	8%
Talking that is unrelated to the assignment	46%	41%	13%	12%
Mathematics-Formulas	33%	37%	30%	40%
Total	40%	35%	25%	100.0%

The group spent 40% of the talk of physics and conceptual talk, compared to 40% of mathematics talk and 8 % of planning talk. This must be seen as a strong result for the CRP as an instructional design. We see improvement of conceptual understanding of resistance. Their experience of anomalies of understanding comes into the light, and their internal teaching helps all three to understand the problem. The mathematics is a large part of the problem, and here the difficulties come to the surface, and they discuss and agree finally on the solution.

Discussion

The group reported in this paper is one of totally 15 in the study so far. To compare with other groups, we find that in small groups working with CRP, a main part of the time is used for talking physics even in low performing groups. With three pupils in a group all are active, but with four one of the pupils tends to stay out of the discussions. Physical models are not understood entirely as models by the students, but numerical calculations out from models are done to verify their reasoning. Analogies are used in high performing groups in their reasoning. In a high performing group, exploratory talks are used between equally strong students, and they teach each other until they all agree on the answer. In a low performing group, the teacher becomes very important to be the one who stimulates the group to go further into the problem, as the connection between mathematical problem solving and the physics problem are not obvious to the students. In the groups studied, all students but one evaluates CRP as fun, interesting and a nice variation in the traditional lessons.

"It was fun to work in small groups. There you can discuss and get other ideas than your own. It didn't feel as something horrible, if we didn't manage to solve the problem. Nice with plenty of time. Fun with the task that was different, not as the traditional and boring "(female student.)

CRP is one way to give students the freedom to communicate, and we found this to be the key to development of understanding. As unique questions are crucial for individuals to get influence of

their anomalies of understanding, we find it important that the students are given several CRPs to choose from, given as long time as possible to work with each problem. The chances for conceptual changes increase with the time the group of students communicate and reflect over the task.
In this study, we have integrated the CRPs into the classroom instruction by decreasing the time for textbook exercises. Group work with CRPs took part at the end of a section teaching Electrical Circuits in a physics course. The students were not examined individually, but the result for each group was discussed with the teacher, and the group gave a written report of their result. It is also possible to introduce CRPs into the classroom instruction examined as a specific activity separated from traditional teaching. The CRPs could also be a very useful part in the studies of physics at university level. At Malardalen University, CPRs are in use regularly in physics courses for students in aeronautical engineering. In this course, 20% of the course time is used for CPRs as a special activity. Also in courses for physics teacher education, CRPs are in use.

Conclusions

Many students feel that they want nothing more than to learn, but they end up with disappointments as they cannot keep up with the speed and demands upon them. One way to contribute to learning of science is to introduce more student ownership of learning. To meet the future, this more humble attitude towards the students' needs could be a way that can help students find science relevant to them. We focus in our study on how group discussions in physics influence the students learning and their ownership of learning. The possibility to communicate in reflective and exploratory talks around the physics problem makes the students to face the individual difficulties they have. The increased student influence impact on learning results.

Acknowledgments

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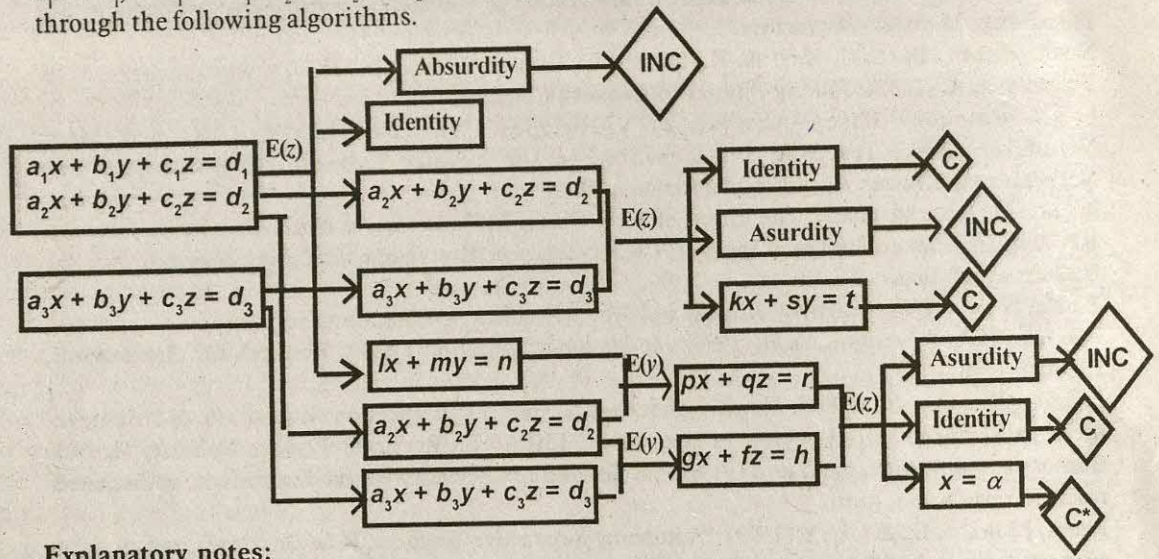
Algorithms of Consistency and Inconsistency of Three Unknown Equations

– Asim Kumar Mookhopashaya *

Here we consider the problem of consistency and inconsistency of the system of equations of three unknowns viz. x, y and z.

$a_1x + b_1y + c_1z = d_1$, $a_2x + b_2y + c_2z = d_2$, $a_3x + b_3y + c_3z = d_3$

through the following algorithms.



Explanatory notes:

E (z or y) stands for the elimination of z or y as the case is from relevant equations and the Eliminant is given in the immediately next box.

Identity is a relation (or statement) which is unconditionally true like $0 = 0$ or $5 = 5$ etc. Two or more identities taken together yield on identity.

Absurdity is a relation (or statement) which is untrue or false like $3 = 5, 0 = 7$ etc. An absurdity appearing at any stage in the flow-chart implies the entire system of equations to be inconsistent.

Kite is given at the end of a series of operations indicating the conclusion as to the consistency or inconsistency of the system of equations of equations under consideration.

C is given inside a kite to signify the system of equations to be consistence or solvable having infinite set of solutions.

C* is given inside a kite to signify that the system of equations under consideration to be consistent or solvable with unique or single set of values of x, y and z.

INC is given inside a kite to signify that the system of equations under consideration to be inconsistent or not solvable i.e. there does not exist any set of values of . x, y and z which can satisfy the system of equation under consideration.

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A Study on Vocabulary and Achievement in Life Science in Sunderban Area in Relation to Physical Science

– Kamal Krishna De *, Smritikantha Bag**

(Abstract: *In this paper the present authors attempted to explore the status of teaching –learning in Life Science in a remote and backward area like Sunderban of West Bengal, mostly inhabited by scheduled caste people. As a part of the investigation they attempted to dig into the development of vocabulary in Life Science of the students of secondary level in this area and to find out the correlation between the achievements of the students in Life Science with their development in vocabulary in Life Science. The authors conducted the study sex-wise and caste-wise and compared the obtained results with those in earlier studies in vocabulary in Physical Science*)

Key words: Vocabulary, Achievement, Life Science, Physical Science :

1.0 INTRODUCTION

In the secondary school curriculum of West Bengal, Life Science was incorporated as a compulsory subject in 1974 and is still in force. Life Science in its integrated approach imparts the knowledge how to live a life in harmony with the environment placing man in the central figure of interaction. The main objectives of Life Science education at school level should be to analyze different situations and indicate probable solutions that are available to improve the conditions of living of man and the quality of his life. It is also to be kept in view that a student of Life Science should be in a position to utilize his classroom learning in daily life through proper achievement and application.

Life Science education in West Bengal has undergone several innovative changes and as a result Life Science teaching began to shift its focus from mere knowledge to understanding, application and skill; from 'chalk and talk method' to discovery learning method, and as such constructivism in its real sense has dominated the teaching-learning of Life Science. More emphasis was put on cognitive instruction, as it appeared to be significant predictor of achievement and thus the objectives of Life Science teaching began to be expressed in measurable terms.

In verbal learning and in communication vocabulary plays an important role. Life Science by nature is highly loaded with different vocabulary derived from different languages world wide. A student is benefited by the teaching if he has a sound repertoire of vocabulary in Life Science. A student having sound background of scientific vocabulary has a better scope of achievement. In the present set-up in teaching and evaluation in Life Science this important aspect was not taken into proper consideration. Under this impression the present researchers considered "Vocabulary in Life Science" as one of the determinants of achievement of students in Life Science and also tried to estimate the relative impact of vocabulary on achievement in Life Science.

2.0 PROBLEM

Ku,Yu-Mir(2001) and Alshamrani(2003) studied the means of improvement of vocabulary; Schuster(2000) studied development of vocabulary among the elementary students; Rath &

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Saxena(1997) and Mukherjee(1997) studied achievement in Mathematics caste-wise and sex-wise respectively; Vandalen and Mhor (1981) examined relation between vocabulary and achievement; Jain (1995) and De (1991) examined relation between vocabulary and achievement in Sanskrit and Physical Science respectively at secondary level. A survey of the studies shows that very little work has been done on the vocabulary of science subjects. Researches on relation between vocabulary and achievement have mostly been done in primary level. So it is necessary to know how far vocabulary helps the achievement in different secondary school subjects more particularly in Life Science. A study on vocabulary and achievement seems to be necessary on the students of backward communities residing in backward place, whose learning very often suffers due to their poor linguistic performances. It is, therefore, particularly important to undertake such study in these places in science subjects and more specially in Life Science which is the prime- mover of modern biotechnology and genetic engineering. The backward places of West Bengal are generally endowed with flora and fauna of nature. At most of the times these places remain beyond the purview of educational studies. A study on the students of these localities might help to get a picture of the teaching -learning of Life Science at grass root level and to grasp the state of the teaching -learning situation at different heights of the society. With this end in view, the present researchers opted to carry on their study in the Sundarban area of West Bengal, a backward place in true sense of the term and is inhabited by a large number of scheduled caste people. To have a better view of the relation between vocabulary and achievement they contemplated to compare the results obtained in case Life Science with those obtained in earlier studies in Physical Science. The problem of the study, thus emerged, may therefore be stated as ::

A Study on Vocabulary and Achievement in Life Science in Sunderban area in relation to Physical Science

3.0. RELATED STUDIES :

De(1991) studied the impact of vocabulary of the students on their achievement in Physical Science. The major findings were:(1)the students significantly differ in vocabulary strata-wise but not sex-wise (2) there exists significant correlation between vocabulary and achievement in Physical Science.(3)better scorers in vocabulary are also better scorers in achievement in Physical Science.

4.0 OBJECTIVES :

The Objectives of the Present Study were:

1. to make an educational survey on the secondary students of relatively backward places like the Sundarban islands of West Bengal, India.
2. to determine the significance of difference in mean scores sex-wise and caste-wise in Vocabulary Test in Life Science
3. to determine the inter-relationships between the Achievement scores in Life Science and Vocabulary scores in Life Science.

4. to find the significance of difference in mean scores in Achievement in Life Science, of the students belonging to high and low scorer- groups in Vocabulary in Life Science

5. to compare the results with earlier observations in Physical Science

5.0. HYPOTHESES :

H_1 -Students would differ sex-wise and caste-wise in vocabulary scores LifeScience

H_2 - Vocabulary scores obtained by the students would be significantly correlated with Achievement scores in Life Science.

H_3 - The High and Low scorers in Vocabulary Test would respectively be High and Low achievers in Achievement in Life Science.

H_4 The findings in the case of Life Science would agree with the observations in the case of Physical Science

6.0. METHODOLOGY :

6.1. TOOLS :

The researchers used two tools

(1) A vocabulary test in Life Science,developed by Bag(2004)

Dimensions of the test are :-

a) Substitution of a group of words by a single word, b) Antonyms,

c) Word Completion, d) Word Identification,

e) Interpretation of symbols, f) Labelling of diagrams,

(2) An achievement test: Life Science test in Secondary Examination (Madhyamik Pariksha) –2005 of West Bengal Board of Secondary Education was considered as Achievement Test in Life Science

6.2 SAMPLE:

Student numbering 625 who had just been promoted to class-X were taken from both sexes of General and Scheduled Castes from 15 Secondary coeducational schools under WBBSE. The schools were located in three remote blocks :Gosaba,Basanti and Patharpratima of the Sunderban area . The cluster random sampling technique was
used for the purpose.The number and categories of the students are shown below:

SEX ↓ CASTE →	General Caste Students	Scheduled Caste Students	TOTAL
BOYS	146	228	374
GIRLS	127	124	251
TOTAL	273	352	625

6.3.: ANALYSIS & FINDINGS

TABLE - 1

Statistical Measures in Vocabulary Test in Life Science

Groups	N	Mean	Mdn	SD	Q
Boys	374	35.09	34.58	11.41	8.51
Girls	251	29.31	29.75	11.01	7.46
GC	273	31.63	32.14	11.39	7.47
SC	352	33.65	32.57	11.68	8.46
GCB	146	34.43	33.92	11.20	8.25
GCG	127	28.42	30.36	10.74	8.17
SCB	228	35.51	35.05	11.52	8.58
SCG	124	30.22	29.06	11.20	7.18
Total	625	32.77	32.37	11.60	7.88

TABLE - 2

Statistical Measures for randomly selected students from different groups in Vocabulary Test.

GROUPS	N	Vocabulary Scores	
		Mean	SD
GC BOYS	30	32.43	9.57
GC GIRLS	30	26.10	11.41
SC BOYS	30	33.83	8.39
SC GIRLS	30	29.50	9.26

TABLE-3

F-ratio for the significance of difference among different groups sex-wise and caste-wish in Vocabulary Test in Life Science

Sources	df	Ss	Variance	F	Significance(p)
Sex	1	853.33	853.33	8.73	$p<0.01$
Caste	1	172.80	172.80	1.77	N.S.
Sex X caste	1	30.00	30.00	0.31	N.S.
Within Classes	116	11341.73	97.77		
Total	119	12397.86			

TABLE-4

t-ratio for Significance of Difference among different sexes and castes in Vocabulary Test in Life Science on the basis of Table - 2

GROUPS	df	Vocabulary Test		
		Difference in Mean	t	Level of Significance
GCBXGCG.	58	6.33	2.29	$p<0.05$
SCBXSCG	58	4.33	1.87	NS
GCBXSCB	58	1.40	0.59	NS
GCGXSCG	58	3.40	1.25	NS

TABLE-5

Scatter Diagram showing the correlation between the scores of the students in the Vocabulary Test in Life Science and those in Secondary Examination in Life Science

Scores in the Secondary Examination in Life Science

Scores in Vocabulary Test in Life Science	Scores	20-29	30-39	40-49	50-59	60-69	70-79	80-89	TOTAL
	59-67			1				2	3
	50-58			4	1	11	6	8	30
	41-49			5	10	13	4	6	38
	32-40		6	9	26	15	2	1	59
	23-31	1	10	18	9	4	2		44
	14-22	5	6	7	4				22
	05-13			4					4
	TOTAL	6	22	48	50	43	14	17	200

$r=0.63\ (p<0.01)$

TABLE-6

Significance of Difference between the Means of Achievemesnt Scores in Life Science as obtained by High Scorer Group and Low Scorer Group in Vocabulary Test

MEASURES	Vocabulary Test	
	High Group	Low Group
N	25	25
Mean	65.96	41.44
SD (Combined)	12.18	
SE_D	3.45	
Difference in Means	24.52	
t	7.11($p<0.01$)	

7.0 ***CONCLUSIONS:***

1. Significnt difference exists between Boys and Girls in Vocabulary in Life Science but not in the case of scheduled caste Boys and Girls.
2. Achievement in Life Science is significantly correlated with vocabulary in Life Science.
3. High scorers in Vocabulary Test are also High Achievers in Life Science
4. (a) De (1991) finds that no significant difference exists between Boys and Girls in vocabulary in Physical Science and it is contrary to the findings in the present study on the vocabulary in Life Science

(b) Vocabulary scores are significantly correlated with achievement scores in Physical Science and this agrees with the findings of the present study in Life Science.

(c) The high scorers in vocabulary are also high achievers in achievement test in Physical Science. This agrees with the observation in the case of Life Science

8.00 DISCUSSION AND SUGGESTIONS

1. In Sunderban area Boys are found to be superior to Girls in vocabulary in Life Science. The observation might vary with the nature of the science subjects, method of teaching, sample and technique of sampling.

2. Development of vocabulary among the students is likely to lead the students towards better achievement in science and hence in better communication.

3. A word may have multiple meanings but when it is used in scientific vocabulary it should be delimited. Its connotative meaning should be differentiated from its denotative meaning. It should be strictly defined with sufficient illustrations. If possible its epistemological significance should also be provided simultaneously.

4. Backward students may have linguistic and vocabulary problems but that problem can be overcome if their self-concept can be developed through appropriate experience, teaching method and teaching –learning materials. In Sunderban area this might have taken place in the case of scheduled caste students who are utilizing in the best way the help they are receiving as per constitutional provision and so there is no significance difference among them as regards vocabulary.

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Environmental Studies And Sustainable Development

– Francis Fanthome*

[The present paper was presented by the author at the Annual Conference AISTA, held at Nagpur at the inaugural session. The synoptic views given in the flow charts would give the interrelationship of different variables connected in global issues of sustainable development and environmental science]

The capability of developing a renewed nation and a new world order lies in the hands/minds of the teachers. If you wait for changes to be paceset, you would be restraining the opportunities that the nation's children rightly deserve, to face the challenges of the emerging knowledge Age. The country has been the motivator and the harbinger of a knowledge driven society. The initiated would argue that the vedic age was indeed one - but its access was limited and humanity had not evolved sufficiently to fathom the depth of the prevailing provisions. In a way some people in India have already lived or continue to ride the upper crust of the evolving spiral. The world community having lived through the Agrarian Age and 300 years of the Industrial Age is now experiencing the dawn of a new Age the **Knowledge Age.**

" There are good reasons for suggesting that the Modern Age has ended. Many things indicate that we are going through a transitional period where it seems something is on the way out and something else is painfully being born." - **Vaclev Havel**

The construct of the new age includes: plurality, diversity, flexibility, inclusion, integration and interdependence and accessing emerging opportunities.

" We are caught in an inescapable network of mutuality, tied to a single garment of destiny. Whatever affects one directly affects all indirectly." - **Martin Luther King**

" We are the first generation global citizens. The choices we make will establish the overall thrust to living, with which humanity will live for generations." - **Duane Elgin**

There occurs a time in the evolutionary process that the social and political order, the thought process of society itself, undergoes sharp transformations and there are rearrangements of institutions. The people at such a cross road cannot fathom the world order before them or the order their children will live in. We are presently living through such a transformation.

In this background and context, the construct of the conversations related to: **Environmental Studies and Sustainable Development,** are presented.

ENVIRONMENTAL STUDIES

Environmental studies in this conversation integrates educational transactions to the living experiences of the pupils. It takes into its consideration the following spheres:

1. The Ecological issues.
2. The Social contrast.
3. The Technology dimension.

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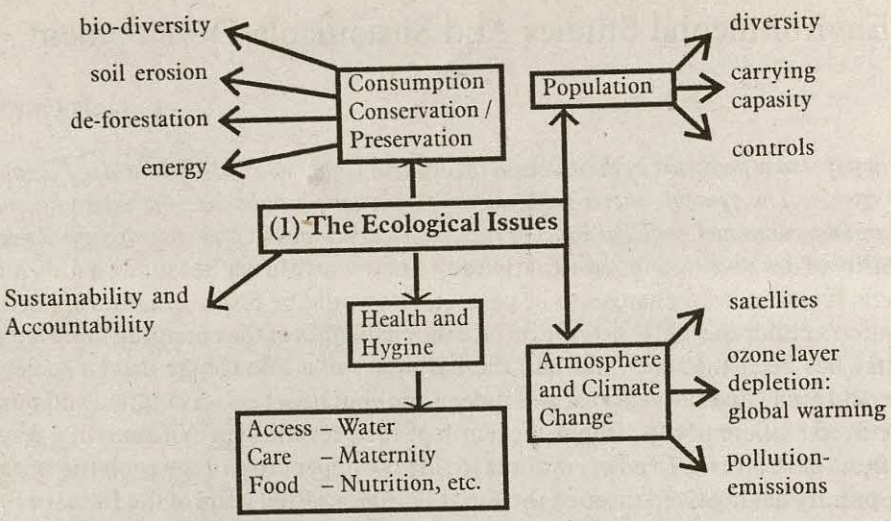
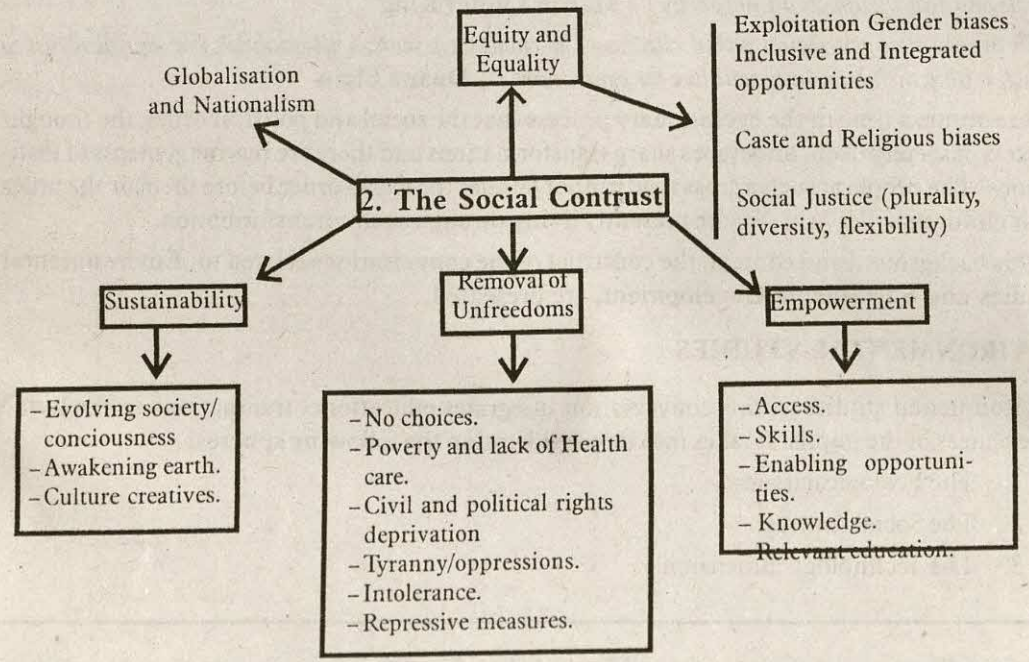


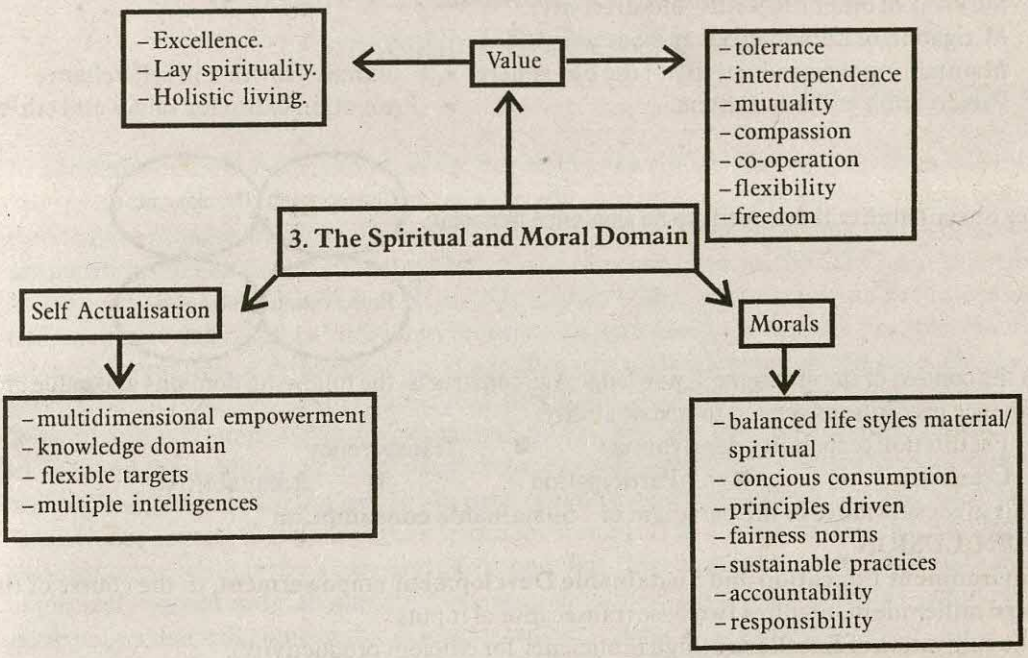
"It is the human species that is devastating the planet and it is the entire species that must learn to live together as a mutually supportive community."

"We the undersigned senior members of the world's scientific community hereby warn all humanity of what lies ahead. A great change in our stewardship of the earth and the life on it is required if vast human misery is to be avoided and our global home is not to be irretrievably mutilated."

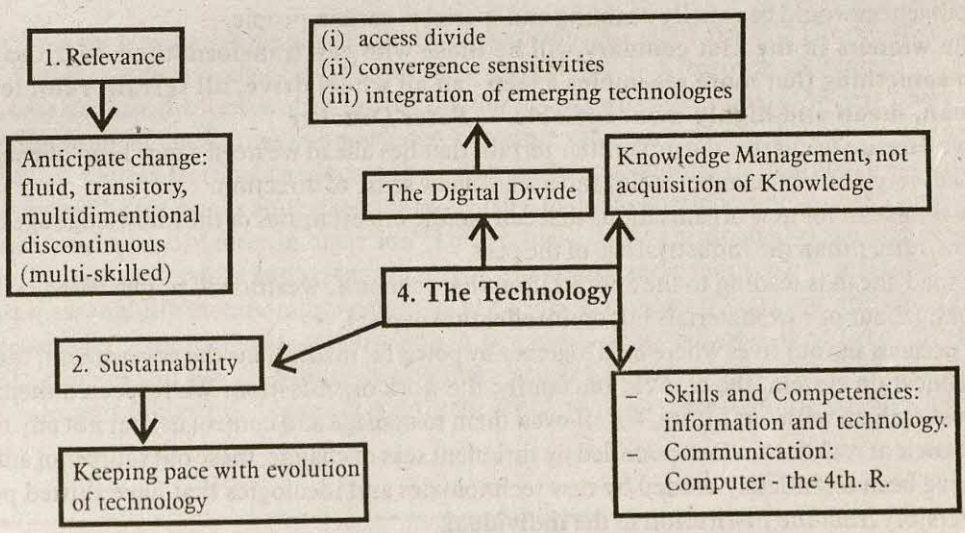
Nobel Laureates – 1992



"Developement requires the removal of major sources of unfreedom, poverty as well as tyranny, poor economic capacity, social deprivation, neglect of public facilities as well as intolerance or over activity of repressive states." – Amartya Sen



"Spirituality is not confined merely to the aspect of conduct; it includes all works and strives by the method of a progressive change of conciousness for the perfect harmonisation of all aspects of works; and through its striving it realises also the unity of works with the highest Knowlwdge and the deepest Love."
"Concept of Integral Education"

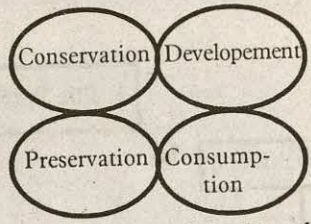


SUSTAINABLE DEVELOPEMENT

Sustainable Developement comprises the following issues:

- Survival of the human race and stabilisation of the population.
- Survival of other life forms (bio-diversity).
- Mitigation of human needs and Social Justice.
- Maintaining the productivity of the bio-sphere.
- Preservation of the ecosystem.
- Economic growth and self-reliance.
- Promotion of higher values and ethics.

For Sustainability there needs to be a balance between:



In the context of the emerging Knowledge Age constructs, the following domains add value and enhance preceptions related to sustainability:

- Facilitation (capability deprivation)
- Transparency
- Creativity
- Participation
- Adaptability

This gives substance to the paradigm of "**Sustainable consumption**".

CONCLUSION

Environment Education and **Sustainable Development** empowerment, in the course of the third millennium, requires **two** base transacational inputs:

The cultivation of **Excellence** (high proficiency for efficient productivity).

Appreciation of **Multiple Intelligences:** This will support: board spectrum appreciation of capability and productivity and celebration of the **Presently:** Linguistic and Logical Intelligences (cognitive) constructs have been the bed-rock of educational transctions in the Industrial Age.

In the Knowledge Age:

Musical, Spatial, Kinesthetic, Naturalistic, Emotional, Spiritual, Interpersonal and Intrapersonal Intelligences would be equally enabling and special to certain people.

"The winners in the 21st centuary will be those who can transform their organisations into something that more resembles a jeep - an all wheel drive, all terrain vehicle that is lean, mean and highly manoeuvrable." - Peter Drucker

As we prepare to charter the unfamiliar terrain that lies ahead we need a new kind of enabling device, very different competencies and a whole new sense of direction.

New times call for new organisations that can handle uncertainties of the knowledge age of the future, rather than the industrial age of the past.

The road ahead is leading to the appreciation that economic wealth will not be based on land, money, labour or raw materials but on **intellectual capital.**

Few decades ago our lives where held together by powerful institutions the government, the law, the education system, the church, the family, the work organisation. We respected them and entrusted them with our future. We allowed them to manage and control us, but not any more. Like ancient rock formations pounded by turbulent seas of change, these old sources of authority have been relentlessly eroded by new technologies and ideologies that have shifted power irreversibly from the **institution** to the **individual.**

Beginners' Science Curriculum in the days to come: Welcome Recommendations of National Curriculum Framework 2005

– Debabrata Majumdar*

Introduction: Science curriculum at the beginning of a child's educational life must be carefully planned to let him/her open up mind to receive more at later years. In this context, National Curriculum Framework 2005 (NCF-2005) is a boon to us as it contains many positive points, we are pointing out since long. However, Prof. Krishnakumar, Director, NCERT, said in a meet in Kolkata on 28th October, 2005 that NCERT is a forum which can recommend such steps and it has recommended the steps after long consultations with about ten thousand people. However, its implementation at different states is a matter of popular demand in the state. He also expressed doubt regarding proper implementation of the document in states, "unless people come forward and take steps for its implementation". So, we have two tasks in this context: (i) to understand the implications of the recommendations so that we may prepare tools for appropriate implementation of those and (ii) to form pressure group to see that the positive steps are taken in due course. While the author desires the second of the above two tasks is tried earnestly, this discourse will briefly address the first one. For this, highlights from NCF-2005 will be extensively quoted and elaborated as those are points on which we are stressing since long. The basic points that will come in this discourse will be sequenced as follows:

1. Importance of environment in child's education
2. What are not to be done in early science education
3. What are to be done in early science education
4. Previous failures and utopias repeated
5. How to avoid utopias: Choice with due consideration to starting platform

1. Importance of environment in child's education: NCF-2005 reads: "The child's community and local environment form the primary context in which learning takes place.... This is not only because the local environment and the child's own experience is the best 'entry point' into the study of disciplines of knowledge, but more so because *knowledge is to connect with the world*. .... Unless learners can locate their individual standpoints in relation to the contexts represented by textbooks and relate this knowledge to their experiences of society, knowledge is reduced to the level of mere information"[1]. To achieve this we must give up the long cherished sense of stale uniformity and go for plurality of textbooks and ensure that "curricular content must meaningfully incorporate experiences of children and their diverse cultural contexts"[2]. For example, "Children in Mahabalipuram in Tamilnadu, may include in their list of things, seashells, pebbles and fish, and those in Chattisgarh near Dandakaranya forest may include nest, bee-hive, and anklet"[3]. These are exactly the points which we are pointing out for a long time [4].

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2. What are not to be done in early science education: Rapid development in science and technology has put a lot of pressure on planners of child's education and a tendency has grown to introduce scientific concepts early. According to many including NCF-2005 this has "roots to the system's tendency to treat information as knowledge. .... Flabby textbooks and the syllabi they cover symbolise a systemic failure to address children in a child-centred manner. Those who write such encyclopaedic textbooks are guided by the popular belief that there has been an explosion of knowledge. Therefore vast amounts of knowledge should be pushed down little children's throats in order to catch up with other countries."[5] But this is very dangerous for the child's future science education as "teaching something before the child is cognitively ready takes away from learning it at a later stage" [6].

Science at preliminary level can not be studied in isolation from environmental and social sciences. Even at upper primary stage one should not try to teach concepts through formal definitions etc., rather "scientific concepts are to be arrived at mainly from activities and experiments. Science content at this stage is not to be regarded as a diluted version of secondary school science. Group activity, discussions with peers and teachers, surveys, organisation of data and their display through exhibitions, etc. in schools and neighbourhood are to be an important component of pedagogy" [7]. Educational technology is to be used with proper sense of pedagogy. Regarding the misuse, a note of caution is: "worse still, today in the name of computer-aided learning, the living world is being turned into animation strips that children are expected to watch on their computer screens" [8]. From personal experience, I know, many people in rural areas are thinking that unavailability of such learning materials is the root cause of the failure of poor rural people to learn science! [9]

3. What are to be done in early science education: Now it seems obvious that "science education in India must undergo a paradigm shift. ...Inquiry skills should be supported and strengthened by language, design and quantitative skills..."[10]. Also, we must remember, "Educational technology must be viewed as supplement rather than as a substitute for hands-on experience, both for classroom teaching and for teacher-training"[11]. There must be huge scopes for the student to construct knowledge. "Intelligent guessing must be encouraged as a valid pedagogic tool. Quite often children have an idea arising from their everyday experiences, or because of their exposure to media, but they are not quite ready to articulate it in ways that a teacher might appreciate it. It is in this 'zone' between what you know and what you almost know that new knowledge is constructed. Such knowledge often takes the form of skills, which are cultivated outside the school, at home or in the community. All such forms of knowledge must be respected"[12]. This constructivist approach has been strongly advocated by the great educationist, Rabindranath Tagore [13] a hundred years back. Interactions among peers and the teachers can help such construction of knowledge enormously. It is a fact that "Children will learn only in an atmosphere where they feel they are valued" [14] and such atmosphere is created only where the children have right to communicate and interact fearlessly.

4. Previous failures and utopias repeated: Anyone with some ideas of previous documents on education reform, such as National Policy on Education 1986, National Curricular Framework 2000, knows that the proposals in NCF-2005 are not altogether new. But many good intentions

have remained in documents only. In fact, Prof. Krishnakumar said in the meetting on 28th October, 2005 that Prof. Yashpal was reluctant to chair the committee for NCF-2005 with the apprehension that it would be 'another document' which would be a source book for M. Ed. Question papers or the like!

Pertinent question is: why such documents end up as 'document alone'. To this, the author has some observations, which are mentioned below in brief for critical review of the esteemed readers.

Broadly speaking, we are trying a paradigm shift from teacher-centred learning to child-centred learning where the closest kin of the child is the teacher. And the teachers are product of the earlier system. "Today, our country engages 55 lakh teachers spread over 10 lakh schools to educate about 2025 lakh children" [15]. We are expecting our teachers will unlearn the attitudes and habits learnt in about 15 years of 'education of rote learning' and then learn the 'new attitudes' and practice those effectively. I will mention two points from NCF-2005 to elaborate how high our expectations are!

"Schools should give much greater emphasis on co-curricular and extra-curricular activities aimed at stimulating investigative ability, inventiveness and creativity, even if these are not part of external examination system" [16].

"Differences between students must be viewed as resources to support learning rather than a problem" [17].

Doesn't these sound like tall claims from average teachers?

Also the level of democracy actually practiced in many places is far from the level of democracy needed to effect "decentralization and emphasis on the role of Panchayati Raj Institutions (PRIs)" [18]

5. How to avoid utopias: Choice with due consideration to starting platform: Academic planners at the top must consider the ground reality. Neither I like to harp on the cases of four-classes-one-teacher schools, nor I like to be hazed out of success of some exceptionally dedicated teachers in 'making some exceptional student without even a book'. I like to point out the limitations of 90% average teachers (of the 55lakh) in a desired one-class-one-teacher situation. In our country, textbook culture is so deeply rooted that many of the primary school teachers have not read even 10 books other than textbooks in their 10+years of schooling. However painstakingly we 'impart' teacher-training to the teachers, they will use the textbook only, till they slowly internalize some joy of doing something else. Till then, we will have to try to mould them slowly to the frame of education about which we are discussing till now.

It is of great joy that NCF-2005 has noted this point and given some serious considerations, albeit the emphasis is slightly less than that would have been satisfactory. There are clear statements regarding reorienting textbooks: "textbooks themselves should be seen as opening up avenues for further enquiry, and students should be encouraged to go beyond the textbook, to further reading and observation" [19].Yes, it is possible to write textbooks in such a way that activities will start right from the book and the child will show clear affinity to go for further enquiry and hopefully drag the teacher in exploring the joy of doing it. The assertion that "productive work needs to be viewed as pedagogic medium for knowledge acquisition"[20] is to be taken earnestly in text books. There should be stories in which children take part in productive work. In this context, acceptance of the need for plurality of textbooks is very important.

Only such texts, in which local knowledge is of importance may be suitable to such exploration. The primacy of home language in textbooks would increase the possibility of interaction among peers and the teachers. It would be possible to write the book in the form of conversation, "a drama" in a sense. If the text is full of conversation of the children (of the class for which the book is meant), the child is likely to identify himself/herself with one of the characters and feel like participating. Also, the acceptance that "NGOs have also produced excellent textbooks and supplementary materials that can be used in schools"[21] is of great importance. If these ideas are accepted in right earnest during implementation, hopefully we will find a true and workable path to the much needed paradigm shift.

Conclusion: National Curricular Framework 2005 has many pedagogically correct highlights that will help the cause of education. Science teachers associations should come together to form strong pressure groups to force the government to implement the recommendations earnestly instead of limiting the reform to eye-wash.

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16. ibid, Ch 3 Curricular Areas, School stages and assessment, §3.3 Science, p.47
17. *ibid, Ch 2 Learning and knowledge, § 2.3 Development and Learning p.15*
18. ibid, Ch 1 Perspectives, §1.1 Introduction p.5
19. *ibid, Ch 3 Curricular Areas, School stages and assessment, §3.4 Social Science, p.48*
20. ibid, Ch 5. Systemic Reforms, §5.1 Concern for quality, p.97
21. *ibid, Ch 5. Systemic Reforms, §5.5.1 Plurality of textbooks, p.113*

Media Coverage on Environment Related Issues and its Impact on the Common Man

– Jayasri Banerjee*

Introduction:-

The concept of environmental education is gradually gaining importance than before. A glance at the activities of national and inter- national educational agencies show that environmental pollution, biodiversity preservation, disaster management, global warming and many other evils of the environment is a great threat to the human civilization. It has been found that scientists and educationalist are in favour of taking several steps, so that challenging task of controlling environment to a sizeable extent can be undertaken properly. The main steps are :-

I . Holding seminars, synopsis, workshops etc. by international, national and regional agencies.

ii. Including environmental studies in the syllabi of primary, secondary, H.S. , Colleges and university levels.

iii. By developing awareness among different kinds of people, literate, semi-literates and illiterates.

The first steps obviously aims to develop awareness about key issues among a small group of people, while the second step is a long term strategy by which student at different levels would be acquainted with environmental issues, its hazards & disasters.

In order to present the evils of environmental issues, certain steps are to be immediately taken. In order to do so, all kinds of people are to be made aware about different aspects of environment difficulties. Such as pollution of air & water, natural calamities, adverse effect of global warming & greenhouse effect, deforestation etc. Some instant and immediate steps are to be taken for developing such awareness among the masses. Such mass awareness can be developed by govt. non-Govt. agencies in local, regional and state levels. State Govt. at present, are allocating funds to school & N.G.O' s for conducting environmental projects through local efforts. The means of communication are mainly organization of lectures, discussion, competition (e.g. essay writing, debate, stories, drama etc), exhibition and similar other things.

Nowadays, we all know that the effectiveness of media is most important communicating information through masses. All people, rich and poor have access to radio & television. Television however is more frequent in the house of village people. All sorts of important information regarding education, principles of self-government, issues of health awareness are communicated through radio & T.V. in an effective way.

Newspaper also plays a prominent part in disseminating current news including environmental issues (e.g. flood, epidemic, diseases, disaster, natural calamities, environmental pollution etc). People comes to know the evil effects of environment pollution and also the remedial measures to prevent them.

The present paper intends to examine the impact of newspaper & T.V. in the development of awareness of the environmental issues. The impact of the media, e.g. radio, computer are not taken into consideration owing to economy, time & other limitations of the author. Moreover, it has been considered that the impact of T.V. and newspaper is more important than others. The objectives of the present study.

To ascertain the extent of coverage, the nature of environmental information in the newspaper during a particular time.

To ascertain the importance given by the newspaper & T.V. on the environment related issues, as opined by the teachers & educators, both male & female.

3. Methodology:-

3.1. Tools - Three types of newspaper on seven consecutive days were collected. Again an opinionaire was prepared to get values of educators & teachers in regard to information given in newspaper & T.V. A

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copy of the opinionaire is enclosed in the Appendix.

3.2. Samples:- The total number of sample was sixteen. All of them were graduates & post graduates, reading in humanities & science group. They belong to age group of 25 to 36.

3.3. Experimentation :- The three newspaper (The Statesman, Anandabazar, & The Times of India) were examined for a week (From 16th February to 23rd February, 2005). The news items on different components of environment were selected from the newspaper. The area of a particular coverage of environmental news were calculated in square cm, takings length & breadth both in cm. Thus the area coverage in different components of the environment in these three newspapers are separately calculated & is presented in Table 1. It is also represented through a Bar - Graph.

Again in the opinionaire, the viewers of T.V. and readers of newspapers were asked to state whether a) there is better coverage (i.e. there is improvement in presentation) in the media than before or b) there is no difference. Then the opinion of the readers of newspapers and viewers of the T.V. on different environmental issues were presented separate table, separately examined and which are presented seperately.

4. Analysis

Table -1 : The area coverage of these news items as has been said earlier are

Environmental Component	The Statesman	Anandabazar	The Times of India	Total Coverage
A1. Environmental Pollution	412.5 Cm	589.05 Cm	300 Cm	1301 Cm
A2. Natural Calamities	1287 "	585 "	1356 "	3228 "
A3. Environmental Awareness	142.5 "	280 "	307 "	729.5 "
A4. Environmental Preservation	187.5 "	281.25 "	50 "	518 "

Table - 2 : Opinions of the readers of newspaper on exposure on environmental related issues

Environmental related Issues	Improvement in Presentation	No Change
A1. Environmental Pollution	11 (69%)	5 (31%)
A2. Natural Calamities	13 (81%)	3 (19%)
A3. Environmental Awareness	9 (56%)	7 (44%)
A4. Environmental Preservation	6 (37.5%)	10 (62.5%)

Table 3 : Opinions of the viewers of T.V. regarding the nature of broadcasting in relation to environmental related issues

Environmental related Issues	Improvement in Presentation	No Change
A1. Environmental Pollution	11 (69%)	5 (31%)
A2. Natural Calamities	16 (100%)	------
A3. Environmental Awareness	10 (63%)	6 (37%)
A4. Environmental Preservation	10 (63%)	6 (37%)

3. Findings:-

As regards the coverages in the newspaper, (as shown in table 1) it has been found that maximum area coverages has been found in the component of natural calamities. The findings are also presented through a bar-diagram. The reason is clear, because recently the disaster of Tsunami have created great panic among the people of the world. Several lakhs of people have died and many others are seriously suffering from hazard. All countries of the world are extending their hands of cooperation to the victims. Also the occurrences of earthquakes are threatening the people of different countries of the world. The information has become a great concern & so it has found its maximum place in newspaper.

Again environment pollution also has received a great coverage to the newspaper – greenhouse effect, global warming, Tsunami and many other issues have been covered in the newspaper. The concern of scientists and environmentalists have been reflected in the newspaper, which give a strong signal to all people. The remedial measures have also been suggested in these newspaper.

The newspaper of development of environmental awareness and the preservation of environment have also been given due importance. The items like deforestation, health hazards & fear psychosis of global warming and many other issues of air & water pollution are causing great harm to the people. So the people are being made aware about all of them through information in newspaper.

The percentages in the parenthesis of the table 2, shows that there has been improvement in the nature of presentation of environmental issues, except on the issues of environmental preservation (A4) where the majority of readers have found no change in the nature of presentation.

Similarly, the percentages in the parenthesis of table 3, show that among all aspects of the environmental components, the majority of viewers of T.V. have expressed that there have been positive improvement in the nature of broadcasting. Again, all the viewers are unanimous in opinioning that the issues of natural calamities has been given top priority in presentation.

4. Interpretation.

From the foregoing observation it has been found that different aspects of environment particularly the issues relating to pollution & natural calamities are being given greater importance in a greater way. The year 2004, has the year of the scientific awareness. Through different activities, a large number of organization have discussed different issues of environments; e.g. water pollution, bio-diversity, disaster management, computer awareness, health awareness and many other issues in different places throughout the country. These aspects have also been focused in newspaper, radio and T.V.

The time coverage of the investigation being very small, which was only one week. It was not been possible to get all such information in our investigation for a greater duration. But the present date shows a positive trend towards the nature of dissemination. Since the environmental problem are very urgent and important, the steps for development of awareness should be faster and greater in later times. As such newspaper & T.V. have to take greater & positive role in the process of dissemination. It is expected that such news should occur more frequently.

Even though the media coverage & its quality are gradually improving, it would be worthwhile to mention that the media should give greater emphasis on publishing & broadcasting environment related issues. Besides general information & its nature, the remedial measures, pollution/disaster are to be given greater stress, so that all people can understand properly what they are to do to prevent the hazards of environment & manage the disaster of the environment.

Forthcoming International Conference of Science Education, 2006 - 07

2006, January 12 -14 The Association for Science Teacher Education International Conference, Location : Portland, Oregon, USA, http://aste.chem.pitt.edu/

2006, April 3 – 6, The National Association for Research in Science Teaching Conference, Location : San Francisco, California, USA, http://www.educ.sfu.ca/narstsite/conference /default.html

2006, April 6 – 9, The National Science Teachers Association Convention, Location : Anaheim, California, USA, http://www.nsta.org/conventiondetail&meeting_ code=2006ANA

2006, April 21 – 22, Natural Science Education at a General School, Location : Kedainiai, Lithuaia, http://www.gu.projektas.It, e-mail: vincents@osf.su..It

June 15 – 17 , 18th Symposium on Chemical Education, Location : University of Bremen, Germany, **"Towards Research-based Science Teacher Education",** http://www.chemiedidaktik.uni-bremen.de

Rationale: The 18th symposium on Chemistry Education taking place at the University of Bremen in June 2006 will continue the long tradition begun 1981 with the first symposium organized by HansJurgen Schmidt. This summer celebrates the symposium's 25th anniversary. 15 out of the 17 previous symposia were held at the University of Dortmund, a tradition which shall be continued in the future. Nevertheless, single symposia have also been held in other German cities in the past. Bremen has the distinguished honor of hosting the symposium in Summer 2006.

The 2006 symposium is titled "Towards Research-based Science Teacher Education". This title will simultaneously continue and develop further the topics of the 2002 and 2004 symposia, which discussed the teacher as the key factor in changing and improving classroom practices. The symposium this summer will reveal and evaluate current research into the views and beliefs of science teachers and the development of these views through science teacher education. Main questions are:

- What do we know about science teachers' beliefs and their pedagogical content knowledge?
- Which ideas and beliefs do student teachers in the sciences bring with them when entering their teacher-in-training program? How do these ideas and beliefs change?
- What do we know about the end results of science teacher education within different frame-works (pre- and in-service)?
- What do we know about the learning of teachers after their initial qualification (life long learning in a dynamic changing world of science and education)?
- What is the state of the art in research-oriented learning within science teacher education today?
- What do we know about the relationship between teacher training and the quality development of classroom practices?
- How can research-based strategies help improve science teacher education and teaching practices?
- What is possible due to learning process while teachers participating in curriculum innovation projects as they take place now in many countries? What is the role and task of the teachers in these innovations? The teachers as (co-) designers, developers, and researchers?

All contributions will be presented by invited lecturers. Suggestions for appropriate lectures are welcome up to Sept. 2005.

2006, May 31 – June 4 : Joint North American-European and South American Symposium, Science and Technology Literacy in the 21st Century, http://www.vcu.edu/symposium2006

The symposium introduces a novel approach to the global exchange of ideas in Science and Technology Education by teachers worldwide. The Symposium will be held simultaneously in three sites; Virginia Commonwealth University, in Richmond, VA, USA; University of Nicosia, in Nicosia, Cyprus; Pontificia Universidad Catolica del Peru, in Lima, Peru.

The sites will be connected through video-conferencing equipment for simultaneous broadcast of the sessions and instant participant interaction., Each location will have presentations geared toward global dissemination through video conferencing to the three locations, and also to its side audience with topics of regional interest. The symposium will address world trends in science and technology education and will provide for scholarly exchange, discussion and other initiatives in the field. We will address the relevancy of what we teach and what the students should know in a world where science and technology have an increasing influence on the way we live and make decisions. Deadline for Proposal Submission is December 15.

2007, July 8 -12, World conference on Science and Technology Education, Location: Perth, Western Australia, http://www.WorldSTE2007.asn.au

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